

SPECTRUM

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South Atlantic Region

Changing to
Secure the Future

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Our Theme: Actions for Change

As a world-class engineering and science organization, the U.S. Army Corps of Engineers has worked to constantly improve the ways in which we conduct business. As a dynamic, learning organization with a rich, 200-year history of service to the nation and our Armed Forces, we have adopted the following Actions for Change, to help us remain relevant, ready, responsive and reliable today and well into the future.

Effectively Implement a Comprehensive Systems Approach: Comprehensively design, construct, maintain and update engineered systems to be more robust, with full stakeholder participation.

- Employ integrated, comprehensive and systems-based approaches.
- Employ risk-based concepts in planning, design, construction, operations and major maintenance.
- Continuously reassess and update policy for program development, planning guidance, design and construction standards.
- Employ dynamic independent review.
- Employ adaptive planning and engineering systems.
- Focus on sustainability.
- Review and inspect completed works.
- Assess and modify organizational behavior.

Communication: Effectively and transparently communicate with the public and within the Corps about risk and reliability, to encourage risk-informed decision making.

- Effectively communicate risk.
- Establish public involvement risk reduction strategies.

Professionalism and Technical Expertise: Improve the state of the art and the Corps' dedication to a competent, capable workforce on a continuing basis. Make the commitment to being a "learning organization" a reality.

- Manage and enhance technical expertise and professionalism.
- Invest in research.



Brig. Gen. Joe Schroedel
The South Atlantic Division Commander

Message from BG Schroedel

This issue of Spectrum is about the Corps' and our partners' responses to a world changed both by the terrorist attacks of September 11, 2001, and by the catastrophic damage of Hurricane Katrina in August 2005. These two events have taught the nation, and its government, important lessons concerning the vulnerabilities of our people and our infrastructure, and the necessity to communicate risk openly and clearly to the public.

The stories told here, about the sustainability of construction, the need for innovative solutions to the weaknesses of aging structures, and the communication of risk, are examples of the South Atlantic Division and its partners putting into practice the "Actions For Change" adopted by the

agency following Hurricane Katrina (see sidebar for a list of these actions). The stories also demonstrate what is possible when creative people, through necessity or volition, break out of old ways of thinking about problem-solving and move in new directions.

I congratulate all who have participated in the inspiring initiatives which are described in this issue, and thank them for their foresight and innovation. It's through actions such as these, and hundreds of others like them around the region, that we produce better products, save taxpayer money, insure the safety of our structures, and sustain the viability of the planet.

DEEDS, NOT WORDS!

Best wishes always,
Joe Schroedel

SPECTRUM

The South Atlantic Division

Commander
Brig. Gen. Joe Schroedel

Jacksonville District

Nancy Sticht
Chief, Public Affairs

Mobile District

Pat Robbins
Chief, Public Affairs

Savannah District

Billy Birdwell
Chief, Public Affairs

Wilmington District

Penny Schmitt
Chief, Public Affairs

Executive Editor

Rob Holland, South Atlantic Division

Managing Editor

Nancy Sticht, Jacksonville District

Design and Layout Editor

Linda Torres, Jacksonville District

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Jacksonville District Applies Lessons Learned to Strengthen Herbert Hoover Dike



Hurricane Katrina's impact on New Orleans shook the nation, most especially raising fear and concern across communities that rely on levees for flood protection. The nation today is more aware of the risks involved in living near water, and only somewhat aware of the process and costs involved in building structures that are more resilient than in the past.

A Jacksonville District team was making steady progress toward the long-awaited construction phase to rehabilitate the 143-mile Herbert Hoover Dike at the same time Hurricane Katrina hurtled its way through the Gulf of Mexico in 2005. Katrina's strike on New Orleans reminded Floridians of when, in 1926 and 1928, hurricane lake waters destroyed muck dikes on Lake Okeechobee's southern shores, resulting in thousands of deaths. It was following these events that Florida requested federal assistance and the Corps was tasked to build the dike.

The Herbert Hoover Dike surrounds 730 square miles of water in Lake Okeechobee and, at about 75 years old, the earthen structure is slowly eroding internally. The dike was known to be problematic for years, but recent hurricanes and wet seasons caused an alarming amount of new damage. With

each extreme wet weather event, the dike eroded internally (called piping) – sometimes in multiple locations.

It was in the late 1990s that the Jacksonville District first published reports showing areas of vulnerability in the dike. A published 1999 report stated that there is limited potential for a dike failure with lake levels as low as 18.5 feet. "The likelihood of a failure increases at higher levels. At 21 feet, a dike failure would be likely at one or more locations."

In 2000, the Corps received Congressional approval to proceed with a rehabilitation design. The Corps' local partner, the South Florida Water Management District (SFWMD), and the Corps reviewed five alternative designs and selected one that kept the design within the existing right-of-way. This design was less robust than the Corps' preferred plan but met both partners' goals of rehabilitating the dike.

This information was all but forgotten in 2006, when Corps projects across the country became suspect. Suddenly the Jacksonville District found itself sliding down a slippery slope in the eyes of Floridians.

While media reports on the dike spiraled, the HHD team was diligently collecting input

from a variety of expert sources, including lessons learned from Katrina. Jacksonville District convened an Independent Technical Review (ITR) panel to further evaluate the design of the rehabilitation project.

"We believed that before moving forward, we should apply the tremendous lessons learned from Katrina," said Col. Paul L. Grosskruger, district commander. The ITR panel included 11 nationally recognized experts from the Corps and the South Florida Water Management District, several of whom had served on the Interagency Performance Task Force to evaluate the New Orleans and Southeast Louisiana Hurricane Protection System. After the ITR review, the district then hosted a second level of evaluation. Conference attendees included about 40 experts who reviewed the ITR findings and discussed future actions for strengthening the HHD. Participants included the ITR panel and additional scientists and engineers from the SFWMD, URS (a global engineering design firm), BCI (authors of a state-sponsored engineering report on the dike), and the district.

"They concluded that the rehabilitation project, as originally designed, met the objectives identified in Corps studies conducted in the 1990s," said Jim Mathews, ITR panel member. However, in light

of lessons learned, they reevaluated the original design to ensure a stronger dike was warranted.

The new design concept endorsed by this group closely mirrored the Corps's preferred alternative developed in 2000, but was not selected because it required additional and costly acquisition of real estate and may have impacted regional groundwater.

"That decision was based on the team's knowledge and best professional judgment at that time. The post-Katrina environment enabled us to overcome significant constraints," Grosskruger said.

The new project focuses solely on public safety and risk reduction goals. In a joint press conference with the state and the ITR panel last fall, the Jacksonville District announced that it had developed a new design approach for the dike rehabilitation project, endorsed by all conference attendees.

The new design concept includes a seepage berm for decreasing piping and a cutoff wall for redundancy and increased stability. The design will also incorporate additional protection features where needed.

"Once the team was given the go-ahead, they moved out and have been making tremendous progress," said Alan Bugg, HHD project leader. The team is designing the project to ensure it provides optimal protection. "We're focusing our efforts to achieve the most significant results while minimizing impacts to local communities," Bugg said.

The team is also expediting the redesign and has started construction in areas that are most in need of repair. With toe-ditch work ongoing, come hurricane season parts of the dike will be at a higher level of safety than they were in the past. The first completed sub-reach design is anticipated this summer, along with cutoff wall test construction on the first of eight reaches in the rehabilitation project. A partial seepage berm will also be initiated this summer, and completed as needed property is acquired.

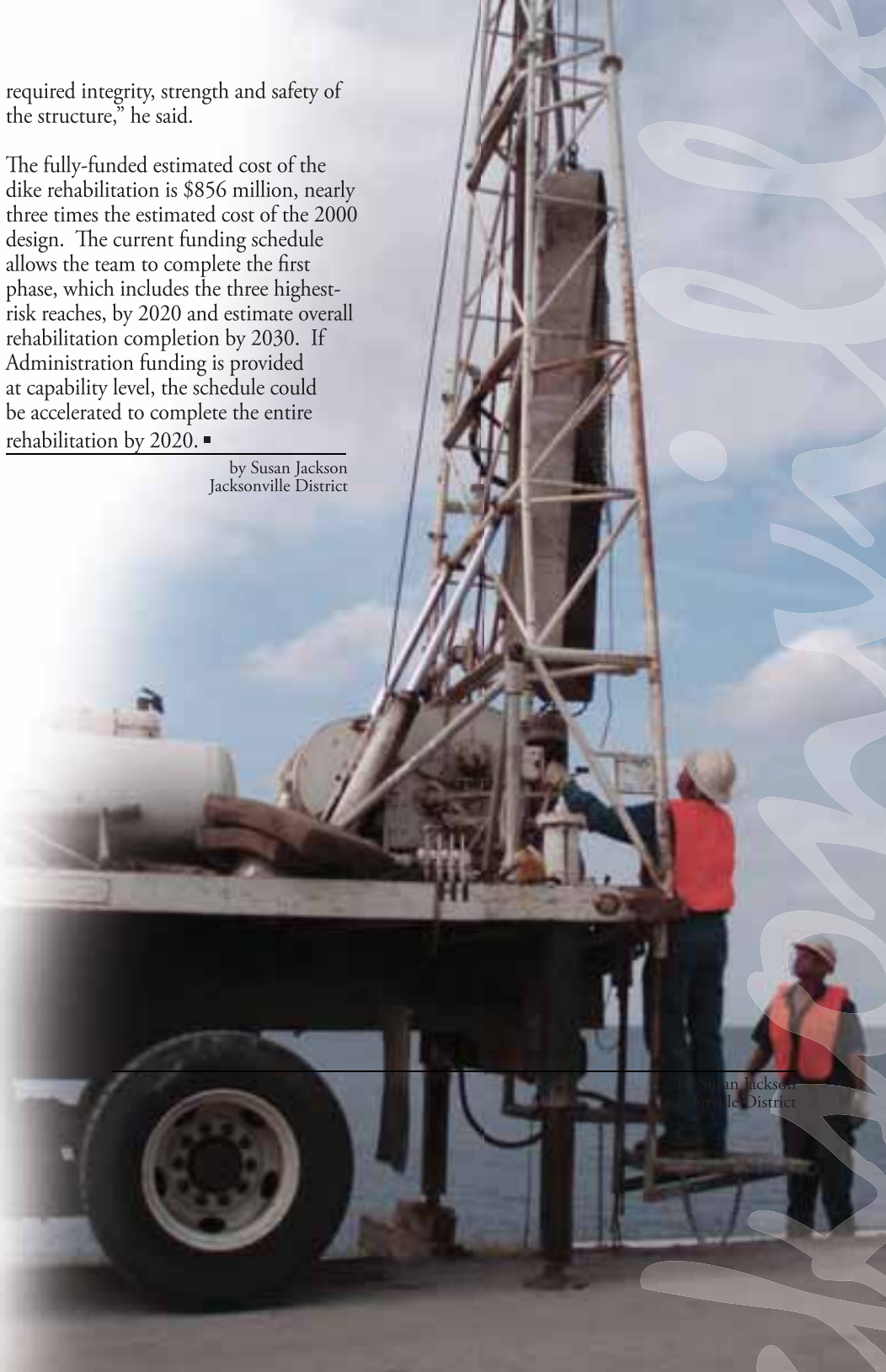
It's the size of the seepage berm that concerns most residents around the dike. Bugg says the berm will be no wider than what is required, in conjunction with the cutoff wall, to provide protection.

"Our rigorous engineering analysis and design process will work to minimize the expansion of the Corps' right-of-way into current private property, while ensuring the

required integrity, strength and safety of the structure," he said.

The fully-funded estimated cost of the dike rehabilitation is \$856 million, nearly three times the estimated cost of the 2000 design. The current funding schedule allows the team to complete the first phase, which includes the three highest-risk reaches, by 2020 and estimate overall rehabilitation completion by 2030. If Administration funding is provided at capability level, the schedule could be accelerated to complete the entire rehabilitation by 2020. ■

by Susan Jackson
Jacksonville District

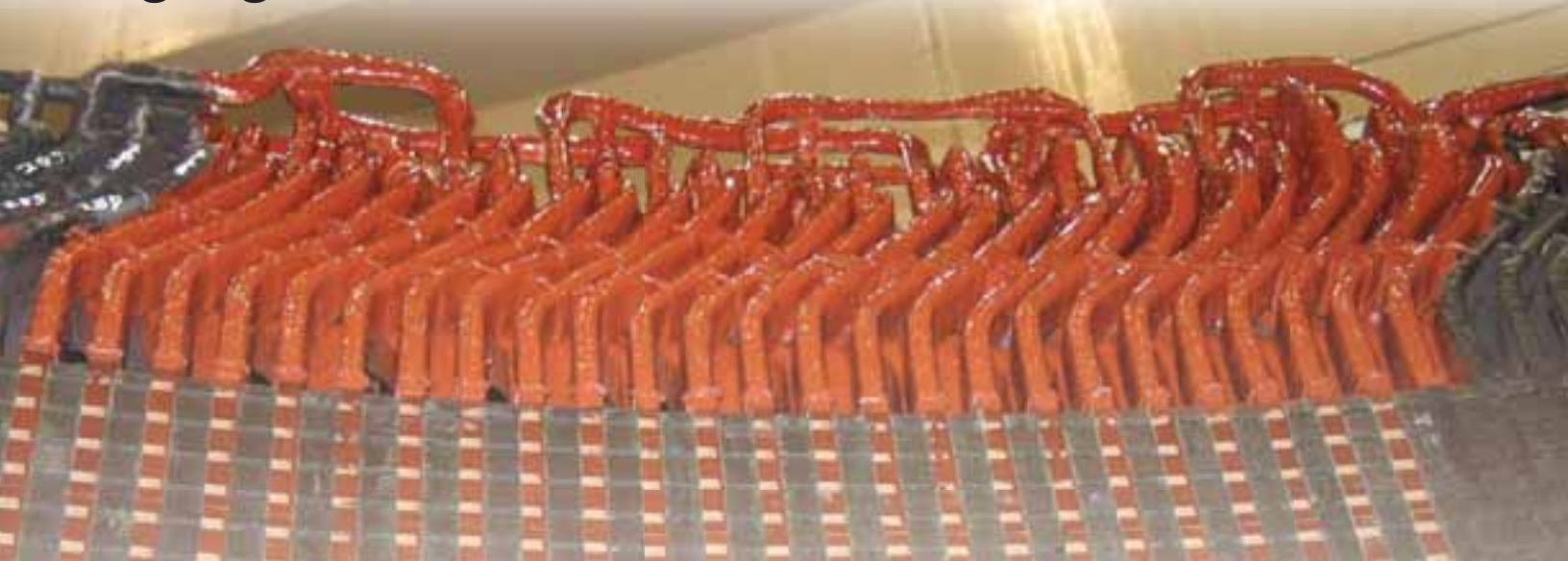


by Susan Jackson
Jacksonville District

The Jacksonville District and South Florida Water Management District direct Lake Okeechobee waters via dikes, canals and floodgates to provide flood and storm damage reduction, prevent saltwater intrusion, assist navigation, and provide water for agricultural irrigation and drinking water supplies to large urban areas in South Florida. Management is a challenge, given that these interests often conflict. The Corps is 100 percent responsible for Herbert Hoover Dike maintenance and rehabilitation, while the local sponsor is responsible for real estate acquisition.

Innovative Thinking

Aging Power Generator Returns to Service



The 30-year old West Point Generating Unit 2, which should have been nearing the end of its 35-40 year life expectancy, has been given a new lease on life. After suffering a devastating winding failure in November 2005, the generator was repaired – actually, it was patched together much like something that would come out of Dr. Frankenstein's laboratory, using transplanted parts from Unit 3, a sister generator in the West Point power plant.

Why?

Well the story actually starts back in July 2003, when Unit 3 experienced a winding failure, much like that experienced by Unit 2, except more severe, according to Mobile District electrical engineer Bobby Earley. The Unit 3 failure and resulting fire within the generator housing, destroyed approximately one-third of the unit's windings. The damages were so severe, that a major rehabilitation of the unit was required to get it up and running again. Due to the untimely failure and cost of repairs, it would take at least a few years to budget, fund and contract for the repairs.

The loss of Unit 3's capacity was a blow to the Mobile District and to our customers. However, Unit 2 was still in service, providing power to customers upon the Southeast Power Administration (SEPA) directions. SEPA provides a daily generation schedule to the West Point plant, depending on the anticipated power demand and the amount of water available

for generation. Life was good until that fateful day in November 2005, when Generating Unit 2 experienced a failure that also resulted in an internal fire, taking it out of operation.

At that point, the only unit remaining in operation was Generating Unit 1, a smaller, 3.5 megawatt unit, as compared to its 39 megawatt cousins in the power plant. "The mission of the West Point power plant is to provide power for the West Point project, the dam, the resource management office, the campgrounds, Anderson compound and the office of the Hydropower Test Unit," said Steve Logan, West Point operations manager.

After the Unit 2 failure, a team was formed, tapping into the expertise from around the South Atlantic Division and the Mobile District (including the Hydropower Test Unit), West Point Hydropower Plant and other plants within the division. The first task, after the smoke cleared, was to assess the damage. Like Unit 3, coils in Unit 2 had been destroyed. However, unlike Unit 3, where approximately 161 coils met their demise, Unit 2 had only lost approximately 18 coils.

David Williams, chief electrical engineer at the Hydropower Test Unit, and other members of the test unit performed the on-site investigation to determine the extent of the winding damage and to present their findings to the team, during a strategy planning meeting with the Community of Practice (CoP).

"Based on Williams' initial assessment, the CoP, which included representatives of the customer, the Corps and West Point project, all believed that the benefits outweighed the risks, and all wanted to repair the unit," said Earley.

The team members knew that it was not uncommon to replace damaged coils with new or spare replacement coils, but it was nearly unheard of to transplant coils that had been in service for 30 years into another generator. Many members of the generating industry doubted the transplant would be successful. The catch was that the units only came with six original spare coils and manufacturing new replacements would be time consuming and costly.

"A minimum of 24 good coils were required to complete the repair. The repair plan was unprecedented and went against the advice of the original equipment manufacturer and other leaders in the design, manufacturing and repair of turbine-driven hydropower generators. The process of removing almost 30-year old stator coils from one generator and using them to repair a second generator was an unusual approach and a first for the industry. We realized that the success of this approach was nearly impossible and at times would be very discouraging," said Williams.

"We were looking at a minimum of six months of manufacturing time for replacement coils and another six months of installation time if we were to contract out the repairs," Early explained. "Even

though the benefit-to-cost ratio was high and the payback was only a matter of months, the funds needed for a complete rewind were not in the budget, and funds were not readily available.”

The idea to cannibalize Unit 3 for coils to repair Unit 2 came out of collaboration at the CoP meeting.

The pro and con list rapidly developed:

Pros

- Pro – if it works, we will be heroes.
- Pro – more than 95 percent of the work will have been done with in-house personnel.
- Pro – if it fails, the experience and knowledge gained in going through the process will be priceless.
- Pro – the customers fully supported the effort to get the unit back in service.
- Pro – we don’t have to wait an additional year for a repair contract or an additional four years to completely rewind the unit.
- Pro – the cost would be approximately \$450 thousand for repairs, including in-house and contract labor and material, versus \$3.5 million for a total rehab of the unit.
- Pro – it would be faster to do the “quick” fix than to wait for a rewind contract to be awarded and completed. If successful, the cost of repairs would be offset by generation revenue within approximately six months.

Cons

- Con – we are stepping into uncharted territory; small replacement projects had succeeded, but never one of this size.
- Con – why repair a 30-year-old winding, when it could fail again during unit start up or shortly thereafter.
- Con – the coils from Unit 3 may not fit, may not work, or may cause greater damage.
- Con – it is a temporary fix.

The pros were winning. Deciding to live the “Just Do It” philosophy, the team sold the idea to management and met with their first major repair challenge – getting a contractor to perform the half-coil splicing.

“David Williams was instrumental in putting together a set of specifications for the solicitation,” Earley said. “David specified to the prospective bidders the number of coil splices to be made, identified the type of coils and type of insulation. He put all the technical specifications together and, with assistance from our contracting office, finalized the solicitation and award.”

None of the bidders would guarantee the repairs, which is contrary to normal good business management practices; however, the circumstances surrounding these repairs were unusual. Normally, when contractors work for the government, warranties and guarantees are part of the contract. In this case, the district could not expect a warranty



Unit disassemble - Rotor being removed.



Thuan Nguyen - Testing coils removed from Unit 3.

since most of the components came from Unit 3, and it would be nearly impossible to determine fault in the event of a failure.

“When we advertised for proposal to do the half-coil splices, we actually had some of the offers come back with recommendations against doing the repairs, and instead proposing a total rewind of the unit,” said Earley. “They were concerned with the condition of the 30-year old coils and how brittle the insulation had become over the years of service.”

A contractor was found and National Electric Coil (NEC) soon became a part of the team.

Several months prior to the NEC arriving to perform the half-coil splices, the team began the painstaking process of removing coils from Unit 3 to

painstaking process of removing coils from Unit 3 to be transplanted in Unit 2. The team knew they had more coils than they actually needed in Unit 3, but were unsure how many coils they would be able to successfully remove without damage.

Williams, who provided technical leadership, explained that each of the removed coils had to be inspected, cleaned, and tested prior to transplanting into Unit 2. "These coils were 30 years old; we had to check the insulation, which becomes brittle with age. Each coil went through a battery of electrical tests. Each coil was inspected and tested in an effort to select the best of the worst coils," he said. "We calculated that we needed at least 24 good coils, just in case one or more tested bad after installing in Unit 2. A total of 207 coils were removed from Unit 3, to find the 24 good coils needed to repair Unit 2."

The team worked for months putting Unit 2 back together. The repaired unit no longer had the sleek appearance of a new, fresh-from-the-factory unit. The narrow factory clearances became even narrower.

During the repairs, the rotor had to be removed to allow access to the stator and coils for the repairs. Standard factory clearance for rotors on these units is roughly 1/2 inch. Once the repairs were complete, the rotor was set back in place with a reduced clearance of 3/16 inch. The reduced clearance didn't provide much room for error when it came time to set the 130-ton rotor back in place.

Once the unit was reassembled, tests ran for the next two days. "We had a week of cleanup and testing prior to startup of the unit," Early said. "The team put in some very long days and did an excellent job of staying focused on the task at hand. There were some checks that we performed while the unit was being reassembled and other tests that were performed after the unit was closed up. Prior to any operational test, we actually took extreme care and performed multiple checks for tools or other objects and material of any kind that could be left in the unit and cause damage."

Early explained that these checks are similar to doing a pre-flight check for an aircraft.

"When the system was brought online for the first time, there were a lot of fingers crossed at West Point and in the district and division offices," he explained with a smile.

The process of bringing the unit online involved a series of steps, starting with the opening of wicket gates to allow water to flow across the turbine and start the rotation of the unit. Next the rotor was excited, to induce voltage on the stator coils. An automatic synchronizer controls the speed, excitation, and phase angle of the unit while monitoring the line characteristics and matching the generator's output to the line. When the unit has a match, a critical event takes place – the breaker closes and the unit goes online. "That was the moment when everyone was holding their breath," Early said.

Once the breaker is closed, the unit is connected to the line and the speed and voltage is locked into the system. Early said, "it's like a bicycle being towed by a locomotive, the bicycle can't speed up or slowdown the locomotive, it's just along for the ride. From that point on, we gradually increase the load, (as if the bicycle was trying to push the locomotive), and watch for temperature increases. This is the heat run, or heat cycle, to make sure all the insulation is still good."

The unit ran for four hours, the repair crew shut it down to evaluate the unit and do more testing. Once it passed, the unit was placed back in service.

"We have many customers to whom we provide power, from eight Mobile plants and three Savannah plants. They were happy to see the unit back up and running," said Early. "The West Point plant is also important in that it has one of only three critical connections to Alabama Electric Coop in the switchyard."

The patched-up Unit 2 has exceeded everyone's expectations. Ron Stuckey, power project manager, took the lead on the installation work at a time when he was short on manpower. Stuckey successfully recruited volunteers from other plants to help with the repairs, and provided the essential leadership to keep the team focused.

"There were a number of people involved in this project. They came from SEPA, the district, the division and other plants. It wasn't like one plant had a problem and it was up to their guys to fix it," Early said. "We had folks from all over on our CoP."

Today, the Frankensteinish Unit 2 is actively producing power for its customers and is scheduled for a major rehab in 2008. ■

by Marilyn Phipps
Mobile District

Several repair team members standing on top of Unit 2 after completing all repairs, testing, and placing Unit 2 in service.

Jacksonville District Helps Project H.O.P.E. with Risk Communication

The audience answered the questions almost before they were asked. "True or False? Lake Okeechobee averages 20 feet deep." "False!" they yelled. "Very good," we said, "it is actually very shallow."

Next question: "The primary cause of water level rise in Lake Okeechobee is from rain that falls directly over the lake." Almost in unison: "False!!" And a few people offering, without even being prompted – "no, the water comes from the area north of the lake."

It was apparent that this group, all staff members of Project H.O.P.E. (Helping Our People in Emergencies), a local group of health care professionals, knew some important facts about Lake Okeechobee.

Then the real test: "During Hurricane Wilma in 2005, wind and waves eroded the Herbert Hoover Dike almost all the way through and could have caused a catastrophic flood." "True!" was the loud and unanimous response. This commonly held misperception is the reason that Jacksonville District's Corporate Communication Office (CCO) joined forces with Project H.O.P.E. in Clewiston, Fla., to help the community understand the truth about Lake Okeechobee and Herbert Hoover Dike in south Florida. The truth, so often misunderstood, is that the dike was not compromised during Hurricane Wilma.

Lake Okeechobee, the "Heart of the Everglades" and the second largest freshwater lake in the United States, is completely encircled by the Herbert Hoover Dike (HHD), a 143-mile, 75-year-old earthen levee. Together they provide many important benefits, such as flood damage reduction, water supply, recreation and navigation. In the aftermath of Hurricane Katrina, the HHD became the focus of increased attention and scrutiny by the Corps, the greater engineering and scientific community, the public and the media, many fearing that the same fate could befall south Florida.

The issues surrounding Lake Okeechobee and the Herbert Hoover Dike are diverse and complex, and the Jacksonville District team understood the fear in the community and the need to build trust and credibility. By arming Project H.O.P.E. staffers with facts and dispelling myths, they, in turn, were equipped to provide accurate information to communities ravaged by previous hurricanes and to individuals traumatized by the unforgettable the images of Hurricane Katrina.



Nanciann Regalado, Jacksonville District, talks to Project HOPE volunteers about Herbert Hoover Dike. (Photo by Susan Jackson).

Project H.O.P.E. was funded by the Federal Emergency Management Agency to provide assistance to people affected by Hurricane Wilma and the four consecutive hurricanes of 2004. Who would be a more trusted messenger of information than the H.O.P.E. staffers, who actually live in the communities they serve? And in turn, who could better explain to the Corps the communities' concerns and misperceptions than Project H.O.P.E.? The resulting workshop was a win-win situation: H.O.P.E. staff learned the facts, while the Corps team identified the kind of information needed by the public as well as the most effective means of presenting the information.

In a subsequent workshop, survivors of the catastrophic Lake Okeechobee floods of 1926 and 1928, which occurred before Herbert Hoover Dike was built, shared their stories. Scenes from recent hurricane seasons, painted by local artists and school children on wood disks were displayed. Listening to and videotaping the survivors' stories, and talking to residents about the images displayed in the exhibit, helped to build relationships and demonstrate the Corps team's care and concern for the safety and well-being of the community.

"Typical public meetings just don't work well in these communities. In fact, they don't work in most communities," said Doug Fowler of Project H.O.P.E. "Our mutual goal is to establish trust and credibility, which can only be earned by communicating on a personal level." ■

by Nanciann Regalado, Jean Pavlov and Nancy J. Sticht
Jacksonville District

Artists and school children shared their thoughts about hurricanes through their artwork at the Storms of Yesteryear event. (Photo by Tony Santana).



Wilmington District Initiatives Fueled by a Proactive State Partner

"When your primary stakeholders and business partners are out front with attitudes, behaviors and leadership that don't just reflect our vision for change, but contribute to building it, then you know you're in a great partnership," says Chris Brayman, Wilmington District Deputy for Project and Program Management. "We are extraordinarily fortunate in the vision and flexibility shown by our most active project sponsors and stakeholders."

The State of North Carolina's participation and leadership are evident in several major project areas. From its well-established partnership with the Corps and other agencies in regulatory matters to the new study to establish a Beach and Inlet Management Plan, the North Carolina water resources community is taking a longer, more holistic view of its resources and working closely with the Corps in its efforts to employ an integrated, comprehensive systems-based approach.

Ecosystem Enhancement Program

The most established program of this kind is perhaps the holistic Ecosystem Enhancement Program (EEP), under which North Carolina has managed mitigation for impacts to streams and wetlands for the last three years. In cooperation with the Corps and other agencies, most notably the state's Department of Transportation, the North Carolina Department of Environment and Natural Resources leads the EEP. The program ensures that mitigations occur within the watershed that is to be affected by a permitted action, the mitigations are carried out before the impacts of project development occur, and to the maximum extent possible, the mitigations provide resources similar to those that will be affected. Thus, even with North Carolina's rapidly developing urban areas, the state's commitment to watershed systems is ensuring that environmental sustainability goes hand in hand with exploding growth.

River Basins and Ecosystems

North Carolina is also a valuable partner in projects and studies that move far beyond single purposes or traditional constellations of purposes, such as flood damage reduction, hydropower, environmental stewardship, restoration and recreation. With important river basin studies like the John H. Kerr Section 216 study on the Roanoke River, the Neuse River Basin study, and the Currituck Sound study, North Carolina has moved fully into the era of evaluating and working with entire river basins and other ecosystems to seek the best ways to restore and sustain water resources.

Neuse River Basin:

How important is this long-term, comprehensive river basin study? American Rivers just named the Neuse as one of America's ten most endangered rivers. The river was also on that organization's 'watch list' several times in the 1990s, especially after weather and nutrient overloads conspired to cause a major fish kill in 1995.

The Neuse River begins in the exploding urban environment around Raleigh, where its upper 22 miles are controlled by the Falls Dam and Reservoir, a Corps project. The river then moves downstream through 23 counties dotted with hog farms and their associated waste lagoons, and other intensively used agricultural lands. The river empties into the lower Pamlico Sound at New Bern. The Pamlico Sound is part of the Albemarle-Pamlico National Estuary, the largest estuary in a single state, and the second largest estuary, after the Chesapeake. Water quality problems are an important issue in the Neuse basin, due to nitrogen and phosphorus impacts on fisheries and aquatic ecosystems. Flooding has also been a problem in the basin. The study seeks to address basin-wide opportunities for improvement in the areas of ecosystem restoration, flood damage reduction, water quality and water supply.

Our cost-sharing partner, the North Carolina Department of Environment and Natural Resources, provides important input on the scope of the issues we should address. State Water Resources, Marine Fisheries, Water Quality and Emergency Management agencies are participating in the study, along with other organizations like the Nature Conservancy, the North Carolina Oyster Steering Committee, North Carolina State University and the U.S. Fish and Wildlife Service.

Four study groups are working on specific areas: Anadromous Fish Habitat Restoration, Estuary Natural Resources Restoration, Fresh Water Wetlands, Streams and Buffer Restoration, and Flood Damage Reduction.

The state of North Carolina has not taken a "wait and see" approach to the Neuse, but instead has been actively working on initiatives ranging from dam removal to habitat restoration since the earliest days of the authorized federal study. The 1997 removal of Quaker Neck Dam, a state initiative in which the Corps provided support, was praised by American Rivers as "dollar for dollar, one of the most cost-effective river restoration projects in the United States." The removal restored access to 75 miles of the Neuse River main stem and 925 miles of tributaries, allowing fish to return to 90 percent of their historic spawning grounds. The Corps also assisted the State of North Carolina with the removal of Rains Mill Dam on the Little River, a tributary of the Neuse, in early 2000.

The state legislated an initiative to reduce nutrient impacts on the river basin by 30 percent in 1998, and has actively campaigned to improve water quality and increase public awareness and participation in protective actions. "North Carolina's continued commitment to improving conditions along the Neuse River have been a key to sustaining this important study," said Brayman. "This is the type of project that speaks to the long-term sustainability of aquatic ecosystems, fisheries and water quality for future generations. We are proud to have such a proactive partner." The study has continued to receive both federal funds and state support since its authorization in 1997.



The EEP ensures that healthy ecosystems continue to support fish like this brown trout snared netted by Wilmington Regulators David Baker and Liz Hair.

John H. Kerr 216 Study:

As the John H. Kerr Dam on the Roanoke River reached its 50th year of service, the Corps, together with the states of North Carolina and Virginia and more than 40 interested agencies and non-governmental organizations joined together to seek ways to better manage flow regimes and other aspects of the facility.

North Carolina and Virginia are co-cost-sharing partners in this project, which focuses on the Lower Roanoke River, one of the finest remaining river swamp forest ecosystems in the eastern United States. The project is currently in the feasibility phase, with a host of ongoing focused studies that will contribute to the overall approach to future management of the Lower Roanoke Basin.

“North Carolina’s Department of Environment and Natural Resources, because of its commitment to and experience with ecosystem-based management of natural resources, provided invaluable leadership in the early phases of the study,” says Brayman. “Now that the project is well under way, we have an amazing constellation of partnerships and teams working to establish data and models for many aspects of basin management.” Working groups are addressing flow modeling, water quality, fisheries, wildlife and sedimentation issues.

Another important partner in the study is the Nature Conservancy, as a result of a July 2002 Memorandum of Agreement with the Corps that formed a partnership under the Sustainable Rivers Program. The partnership’s intent is to minimize the effects of project operations on rivers and to restore and preserve rivers across the nation.

Currituck Sound Study:

If the two river basin studies are complex, the Currituck Sound study offers even more challenges. “Usually when you have a project, you know what the problems are and what the restoration goals are,” says project manager Mitch Hall. “There’s still debate about what the problems here really are. Historically, the sound has shifted from fresh water to salt water regimes, so the restoration process truly is about what as much as it is about how.”

The State of North Carolina puts a high priority on this natural resources project, citing future fishery and water quality benefits as enough reason to place it on the list of priorities for funding. The state has contracted with Elizabeth City State University, the North Carolina (UNC) Estuarine Research Reserve, and the UNC-Chapel Hill Institute of Marine Sciences to collect and process data and water quality samples for the study.

The study is covered in more detail in the Winter 2007 issue of SPECTRUM, in “Wilmington District Leads Multi-Agency Effort to Restore Currituck Sound,” pp 14-15.

Beach and Inlet Management Plan

“Often, when resource agencies or organizations ask us to take a holistic or systemic look at water resources, our first question is ‘Who will sponsor a broad-based project like that?’ In our case, we have a state sponsor that initiated the broad-based systemic overview project on their own, turning to us for consulting help,” said Brayman about the North Carolina Beach and Inlet Management Plan.

What John Morris, North Carolina Division of Water Resources Director, says is: “We realize, after working with the Corps on this for so many years, that our inlets and coastal navigation channels are not separate from our beaches. They are all one system. The beach-quality sand in that system is highly valuable to our coastal communities, just as safe navigation is valuable to our fishing fleet and the recreational boaters who ply our waters. We ought to think of these as one system, and work to maintain them in a way that does the best possible job of maintaining both.”

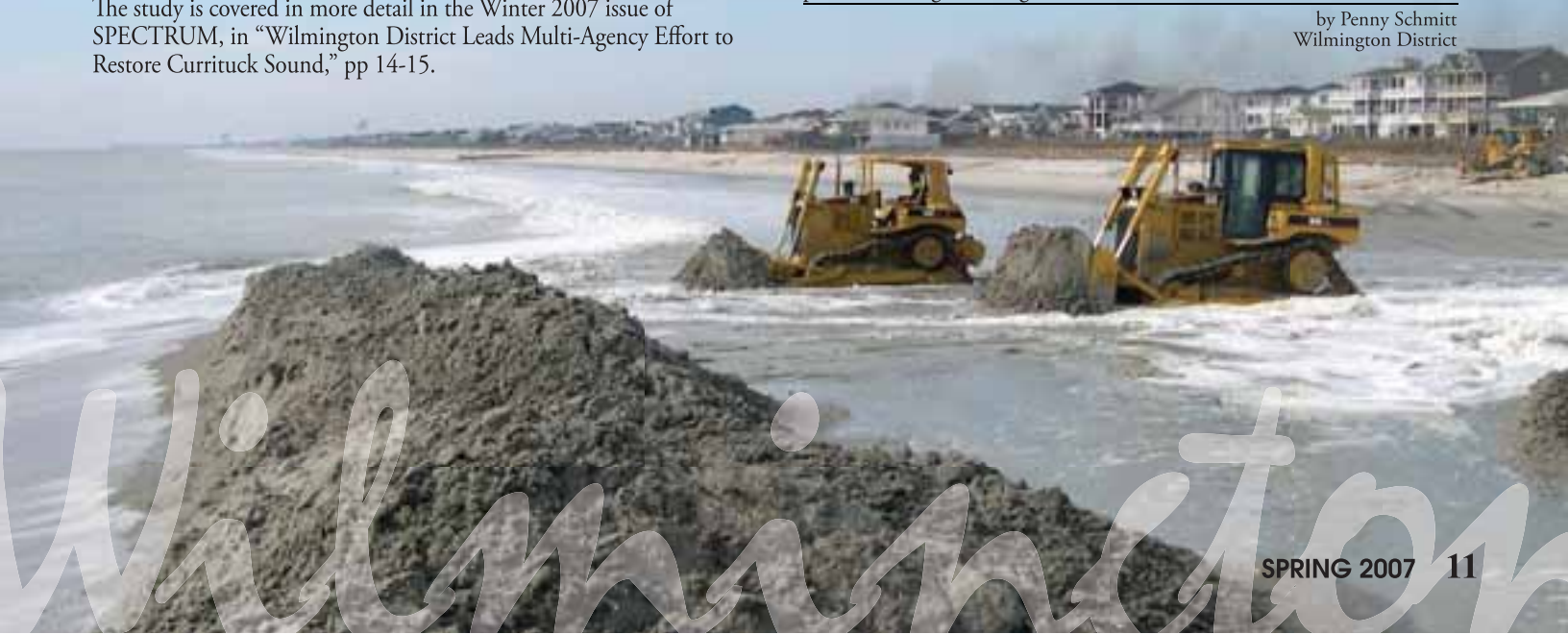
To that end, North Carolina’s coastal communities and state Division of Water Resources Management have taken the initiative to start creating a Beach and Inlet Management Plan, otherwise known as a Regional Sediment Management Plan or Regional Sand Management Plan.

In this case, our state partners contemplate a study to develop a multi-year strategy for managing and protecting North Carolina beaches and inlets. The plan will document beach erosion rates, shoaling rates in navigation channels, opportunities for beach nourishment and policy and financing options. The study report product will be a preliminary management plan with cost estimates for each beach. Although the state’s agencies and contractor support will take the lead, the consultants will use existing information from all available sources, including the Corps.

The state of North Carolina sees this initiative as urgent, because of a decline in federal funding for such projects and because local communities have undertaken projects on their own. The Corps has been invited to participate as part of the advisory committee for development of the long-range state plan.

“When you look at this array of initiatives and the proactive role North Carolina’s Department of Environment and Natural Resources and other agencies are taking, I think you can see that this is one part of our world where holistic, ecosystem-based management of natural resources is not just a vague concept, but a lively reality,” said Brayman. “We have a lot of great things to look forward to and bring to fruition, with our partners taking a leading role.” ■

by Penny Schmitt
Wilmington District



Sustaining the Force: Finding Ways to Make Life Better for Our

Transforming the Army means transforming how the Army lives and works. Over the past several years, the U.S. Army has undergone a tremendous restructuring in the way it organizes, trains, equips and employs combat units and individual Soldiers. To incorporate this change, the U.S. Army Corps of Engineers has changed the way it designs and builds facilities.

In designing these improved facilities, the Corps faced the added challenge of constrained budgets and the desire to impact the natural environment as little as possible. Considering sustainability in the early plans for facilities allows the Corps to produce a better building with reduced impact on the environment.

Lt. Gen. Carl Strock, former Chief of Engineers, incorporated a focus on sustainability into his Actions for Change, announced in 2006. This brought the program, already well under way in Savannah District and the South Atlantic Division, into the forefront.

“Sustainability in construction is about trying to save our planet – not wasting its limited resources or polluting it,” said Judy Milton, an architect with the Savannah District and expert on sustainability, in describing the

importance of considering the environmental impacts of construction during planning and design. Adding sustainability features into construction has real customer benefit too, because it improves occupant conditions and saves money significantly over the life-cycle of buildings the district constructs, she said.

Savannah District has the largest military construction program in the Corps, with more than \$1 billion in current and projected construction. If not addressed early, this amount of construction can place a significant strain on resources and the environment. Every new facility the Corps builds for the Army must meet the Leadership in Energy and Environmental Design (LEED) Silver rating, Milton said. LEED is a construction industry standard for measuring sustainability.

The Army’s earlier standard, the Sustainable Project Rating Tool (SPiRiT), established basic sustainability requirements for the Army. LEED puts the Army in line with industry and uses criteria that contractors must follow in their private sector projects. With the phase-out of SPiRiT in 2008, LEED now applies to all new Army vertical construction. Milton expects that as the program progresses, even higher LEED goals may be set by the Army.

Under the new guidelines, project designers seek to reduce energy consumption in new construction. Changed lighting, increased use of natural light, better insulation and more efficient heating and cooling contribute to energy reduction “points” in the LEED program. Reducing the volume of potable water use also garners points. This can include more efficient bathroom fixtures, using captured rainwater for irrigation, or using native plants that do not need irrigated landscaping.

For Soldiers, the result is a better facility that improves their living conditions, is easier to maintain and lasts longer.

“The indoor environment is significantly improved [over earlier construction methods] – in indoor air quality, in comfort, and in reduced exposure to harmful chemicals used in traditional construction,” said Milton. In addition, many projects incorporate natural daylight and scenic views of the outside, to make Soldiers’ living and work areas more pleasant.

“Savannah District has taken the lead in developing tools for incorporating and validating sustainability that are available to the rest of the Corps of Engineers,” Milton said. “We compare very favorably with the

Ensuring sustainability is built into the designs of modern brigade complexes, such as this one at Fort Bragg, N.C., built by the Savannah District. The efficient design places Soldiers’ living, eating, and work spaces together, makes strong use of natural light, and energy efficient utilities. (Photo by Jonas Jordan)



Our Soldiers

private sector in sustainability because of our across-the-board commitment to it.”

In order to increase the sustainability of a project, designers and builders also look for ways to increase recycling. This can include recycling of construction waste and increasing the amount of recycled content in materials used in construction of a new building. Almost all the domestic steel used in construction today is from recycled material, according to Milton. Some projects grind used concrete for use in new construction or in paving. She noted that during replacement of the 16th Military Police barracks at Fort Bragg, N.C., used refrigerators were offered to a national charity for re-use, rather than sending them to landfills.

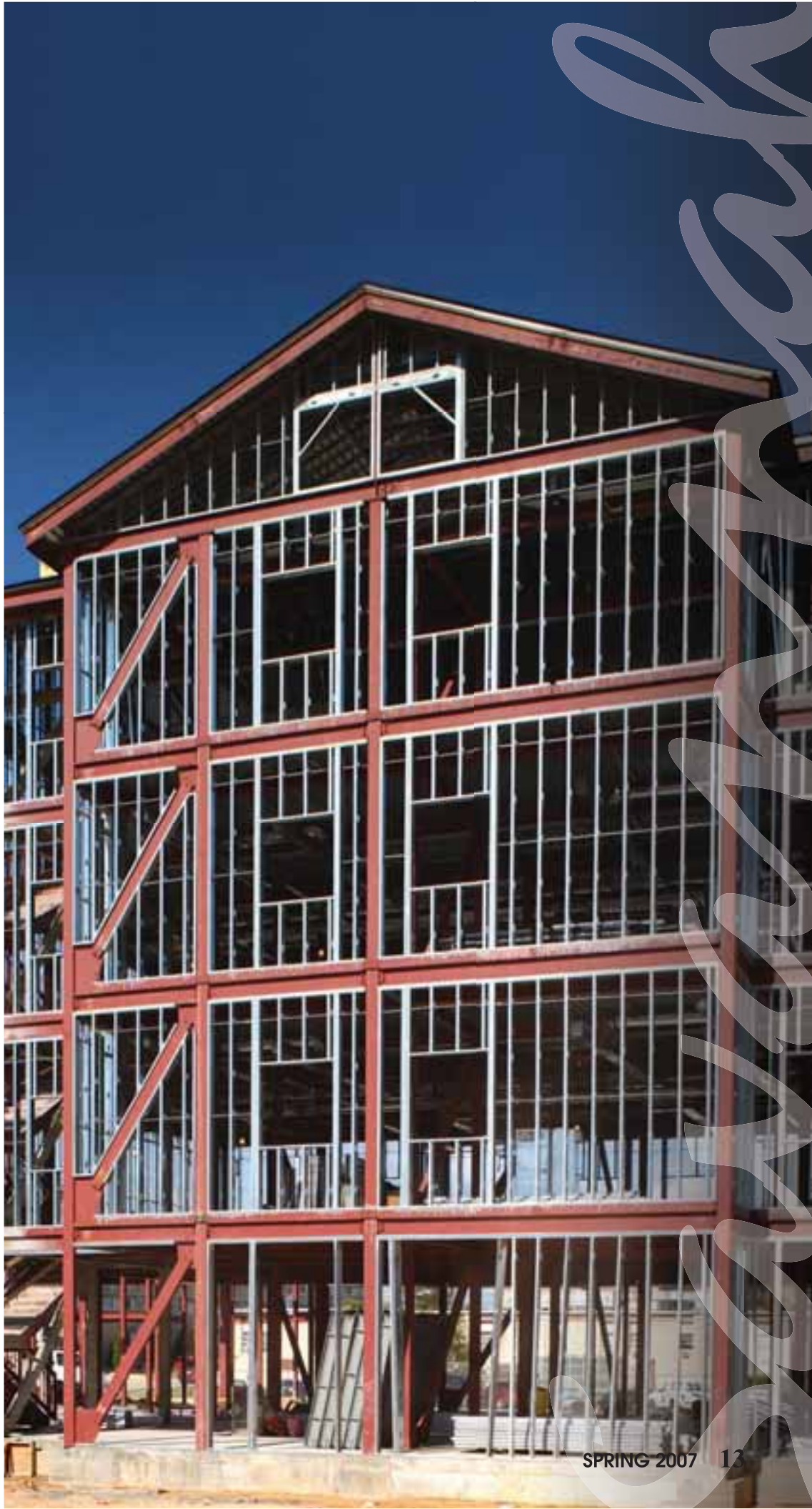
By incorporating sustainability into so many projects, the Savannah District and the U.S. Army Corps of Engineers has been the springboard for niche industries to blossom. “Building material recycling companies have benefited due to our demand, which creates a more viable resource for the private sector to recycle more material,” she said. Keeping excess building material out of landfills benefits the entire community.

Milton sees the sustainability program in the Corps of Engineers as an extension of a bigger program – one with global implications. “We have to take care of our planet,” she said. “Sustainability in construction is a big commitment to that effort. Before, the industry was not on a sustainable path – today we are.”

At the same time, Milton recognizes that sustainability in construction goes hand-in-hand with the Corps of Engineers’ ultimate purpose: to support the Army and Soldiers. The official definition of sustainability, Milton says, is “meeting the needs of the present without compromising the needs of the future.” ■

by Billy Birdwell
Savannah District

Almost all steel used in new construction within the Savannah District comes from recycled material. Using recycled material saves money, conserves resources and prevents overloading of landfills. (Photo by Jonas Jordan)



Low-Visibility Inspection of Completed Works Program Suddenly in the Spotlight



Pretty landscape? Maybe, but this is the slope of a levee that has been invaded by shrubs and even small trees. The root systems allow water to penetrate and weaken the levee.

Just as the events of September 11, 2001 had long term effects on attitudes toward security throughout the nation, the aftermath of Hurricanes Katrina and Rita have had long term effects on our vigilance about flood damage reduction structures.

Wilmington District, historically in the eye of hurricanes, has a good track record for keeping close watch on flood damage reduction structures. For many years, our dam safety program enjoyed the leadership of now-retired Boyd Alig. Today, Don Smith of our Geotechnical Engineering (Geotech) section is the Regional Engineering Center dam safety coordinator and Ann Hinds, also of Geotech, is the Wilmington District dam safety coordinator. Together, they lead the vital program to monitor condition and structural integrity of our five major flood damage reduction structures: John H. Kerr Dam, Philpott Dam, Falls Dam, B. Everett Jordan Dam, and W. Kerr Scott Dam. The structures are monitored all year long, and the district's dam safety committee meets regularly to stay current with all conditions at our dams.

Beyond those obvious behemoths on the North Carolina and Virginia landscapes, Wilmington District also oversees a significant number of other flood damage reduction structures. Some of these projects were built by the U.S. Army Corps of Engineers, or with our assistance. However, nearly all are owned by county or municipal governments, who are charged with maintaining them so that they will continue to offer the flood protection they were designed to provide.

When properly maintained and able to perform as intended, these projects are eligible, if damaged by flooding, to be repaired to original standards with federal funding provided under Public Law 84-99. In turn, property protected by such a facility enjoys a reduced rate for flood insurance, provided the structure gets a 'passing' grade.

That's where Wilmington District's Inspection of Completed Works (ICW) team comes into the picture. The team regularly inspects the 36 active facilities under our purview. They report identified

deficiencies to the project sponsors, who are expected to repair them in timely fashion. The program, formerly carried out by our Emergency Operations staff, is now led by Geotech chief, Greg Griffith, and his team.

"We feel that the combination of structural and geotechnical expertise on Greg's team, and the connection to county and municipal emergency managers on my team offers the best skills to make sure we support communities in caring for these important facilities," said emergency operations manager Ron Stirrat.

Princeville Dike, a sizeable levee built to protect the historic town of Princeville, N.C. from the ravages of the Tar River, is likely Wilmington District's most well-known flood damage reduction facility. In 1999, Hurricane Floyd so overwhelmed the river that the dike was breached near a railroad cut, the town was inundated and many homes and businesses were flooded. Since then, Public Law 84-99 funds have been used to restore the dike, and a better closure

for the gap at the railroad cut has been designed and completed. Edgecombe County is now responsible for maintaining the dike.

Other notable works include the Deep Creek levee at the tiny town of Speed, N.C., which was also affected by Hurricane Floyd, and levees built to protect municipal wastewater treatment plants in Danville and Roanoke, Va. and Clinton, N.C. The Ararat Levee and flood wall protects part of the city of Mount Airy, N.C. Still other levees, some in less than perfect condition, were built to protect croplands.

What causes these structures to deteriorate? “The problems can be anything from invasion by tree roots, which provides a path for water to undermine the levee, to actual breaches in a levee caused by activities like logging or inappropriate loading of material stored against flood walls,” Griffith said.

Of some of the flood control works that no longer provide the intended protection, Griffith explained: “Our responsibility is to make it known to the sponsoring county or town that the structure will not function as intended. Then it becomes a local decision: is it worth spending the public funds required to return the project to its full function? In some cases, obviously those where life and property are no longer a significant risk factor, and repair costs are high, it may not be worth it to the local government to restore the structure.”

Of course such a decision can have the unpleasant effect of rendering formerly protected areas more flood-prone and far less insurable. That’s why the Corps has made a decision to give sponsoring counties and communities a year to complete repairs before declaring levee and flood wall projects rated unsatisfactory in 2006 as “inactive.” And that’s why levees and other structures have been in the national news.

National attention recently focused on the little-known structures because the Corps’ nationwide intensification of inspections and reporting of deficiencies has become more widely known and scrutinized. In January 2007, USA Today published a listing of 146 levees and other flood control structures nationwide deemed by Corps inspectors as deficient, potentially putting lives and property at risk.

One of these 146 facilities is a levee that protects the Wastewater Treatment Plant for the City of Roanoke, Va.



This flood wall is being weighed upon by someone’s equipment. The safety of the structure can easily be compromised in such situations.



Would you guess there’s a flood wall behind this woodpile? And the strong growing tree against the wall is also sending down damaging roots that can undermine its effectiveness for flood control.

“We expect the deficiencies at this site to be resolved within the year grace period granted by the Corps,” Griffith said. “The City of Roanoke and the Western Virginia Water Authority incurred the deficiency rating because they are in the process of increasing the level of flood protection for the facility. Their construction project has temporarily compromised the integrity of the original structure, but we expect it to be back on the list of facilities in good standing when the improvement project is completed later in 2007.” ■

by Penny Schmitt
Wilmington District

